

WHAT IS CLAIMED IS:

- 1 1. A method of aligning fibers on a substrate comprising:
 - 2 placing a grooved substrate on a base proximate to an opening formed through
 - 3 a top surface of the base;
 - 4 flowing air through the opening to draw the plurality of fibers down towards
 - 5 the top surface of the substrate;
 - 6 placing a plurality of fibers to extend over the substrate and over the opening;
 - 7 and
 - 8 bonding the plurality of fibers to the substrate.
- 1 2. The method of claim 1 wherein the base includes a substrate holding area formed
- 2 in the top surface of the base and proximate to the opening, and wherein said placing a
- 3 substrate on a base further comprises:
 - 4 placing the substrate within the substrate holding area.
- 1 3. The method of claim 2 wherein the substrate includes a first plurality of grooves
- 2 formed in a top surface of the substrate and wherein said placing a plurality of fibers further
- 3 comprises:
 - 4 placing one of the plurality of fibers within one of the first plurality of
 - 5 grooves.
- 1 4. The method of claim 3 wherein the opening is horizontally longer in a first
- 2 dimension than a second dimension relative to the top surface of the base, and wherein said
- 3 placing the substrate within the substrate holding area further comprises:
 - 4 placing the substrate proximate to a side of the opening of the first dimension,
 - 5 wherein the first plurality of grooves are substantially perpendicular to the side of the first
 - 6 dimension.
- 1 5. The method of claim 4 wherein the base includes a second plurality of grooves
- 2 formed in the first surface of said base that are spaced from the substrate holding area,
- 3 wherein the second plurality of grooves are in substantial alignment with the first plurality of

4 grooves in the top surface of the substrate, and wherein said placing one of the plurality of
5 fibers further comprises:

6 placing a first section of one of the plurality of fibers within one of the first
7 plurality of grooves formed in the top surface of the substrate; and

8 placing a second section of the same one of the plurality of fibers within a
9 corresponding one of the second plurality of grooves formed in the first surface of the base.

1 6. The method of claim 3 wherein the substrate includes a second plurality of
2 grooves formed in the top surface of the substrate that are spaced from the first plurality of
3 grooves, wherein the second plurality of grooves are in substantial alignment with the first
4 plurality of grooves, and wherein said placing one of the plurality of fibers further comprises:

5 placing a first section of one of the plurality of fibers within one of the first
6 plurality of grooves; and

7 placing a second section of the same one of the plurality of fibers within a
8 corresponding one of the second plurality of grooves formed in the top surface of the
9 substrate.

1 7. The method of claim 5 or 6 further comprising:

2 applying a bonding material on the plurality of fibers; and
3 placing a holding cap in contact with the bonding material.

1 8. A method of aligning fibers comprising:

2 placing a plurality of fibers on a base to extend over an opening formed
3 through a top surface of the base;

4 flowing air through the opening to draw the plurality of fibers down towards
5 the top surface of the base;

6 positioning each of the plurality of fibers in substantial alignment; and
7 transferring the plurality of fibers to a substrate.

1 9. The method of claim 8 wherein the base includes a first plurality of grooves
2 formed in the top surface proximate to the opening, said method further comprising:

3 placing one of the plurality of fibers within one of the first plurality of
4 grooves.

1 10. The method of claim 8 wherein the opening is horizontally longer in a first
2 dimension than a second dimension relative to the top surface of the base, and wherein said
3 placing a plurality of fibers further comprises:

4 placing the plurality of fibers substantially perpendicular to a side of the
5 opening of the first dimension.

1 11. The method of claim 9 wherein the base includes a second plurality of grooves
2 formed in the first surface that are spaced from the first plurality of grooves, and wherein
3 said placing one of the plurality of fibers further comprises:

4 placing a first section of one of the plurality of fibers within one of the first
5 plurality of grooves; and

6 placing a second section of the same one of the plurality of fibers within a
7 corresponding one of the second plurality of grooves.

12. The method of claim 11 wherein said transferring further comprises:

2 positioning a first surface of a substrate to contact the plurality of fibers,
3 wherein the first surface of the substrate has a bonding material applied to contact the
4 plurality of fibers.

1 13. The method of claim 12 wherein the base includes a plunger slidably coupled to
2 the base, and wherein transferring the plurality of fibers to a substrate further comprises:

sliding the plunger to contact one of the plurality of fibers and the substrate.

14. An apparatus for aligning fibers on a substrate, the apparatus comprising:

2 a base having a first opening through a top surface, said base having a
3 substrate holding area formed in the top surface of said base proximate to the first opening;
4 and

5 a substrate held within the substrate holding area, said substrate having a first
6 plurality of aligned grooves formed in a top surface of the substrate.

1 15. The apparatus of claim 14 wherein the first opening connects to a second opening
2 formed in a second surface of said base.

1 16. The apparatus of claim 15 wherein the first opening is horizontally longer in a
2 first dimension than a second dimension relative to the top surface of said base, and
3 wherein the first plurality of grooves in said substrate are substantially perpendicular
4 to a side of the first opening of the first dimension.

1 17. The apparatus of claim 16 wherein said base includes a second plurality of
2 grooves formed in the top surface of said base and spaced away from the substrate holding
3 area, and

4 wherein the second plurality of grooves are in substantial alignment with the first
5 plurality of grooves in the substrate.

1 18. The apparatus of claim 17 wherein the spacing between each of the first plurality
2 of grooves is less than the spacing between each of the second plurality of grooves.

1 19. The apparatus of claim 17 wherein said substrate includes a second plurality of
2 grooves formed in the top surface and spaced away from the first set of grooves, and
3 wherein the second plurality of grooves are in substantial alignment with the first
4 plurality of grooves.

1 20. The apparatus of claim 19 wherein the spacing between each of the first plurality
2 of grooves is less than the spacing between each of the second plurality of grooves.